MEMORIAL ADDRESSES

HIDEYO NOGUCHI
1876-1928

THEOBALD SMITH,
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By those who knew Hideyo Noguchi he will not be forgotten. His kindly, cheerful disposition, his loyal friendship, his warm, affectionate personality, and his modesty have endeared him to his associates. His place in medical and world history, however, will be determined by the products of his labors after his personal friends shall have followed him.

The formidable scientific output of the present generation, with a promise of still greater productivity of the next, will make many achievements of the immediate past seem commonplace; and the silence of comparative oblivion will descend and envelop even those who have in a conspicuous manner served humanity. In science, so interlocking have become the items making for some outstanding discovery that in the future it may be desirable to raise a monument to the unknown scientist who was the first proponent and inciter of some specially noteworthy advance.

There appear, however, at rare intervals men whose originality and whose capacity to bring that originality to actual fruition are so manifest that with little or no dissent their colleagues and co-workers are prepared to lift them well above the common level. Such a figure was Hideyo Noguchi. The achievements of such men grow as they recede from us in time instead of gradually merging into the commonplace.

In the conduct of scientific research we may postulate three main concepts: the guiding idea or forecast, the method or technique, and the result or outcome. The world

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at large cares only for the outcome. To the scientist, the other items are of supreme importance. If the forecast is well considered, even a faulty method may carry the worker to success. With a superior technique, he may obtain results by boring in many directions without any guiding plan. It may happen that the idea does not guide, the method may not work, but even then an accident may bring results. This is frequently the common lot.

It is too early to attempt an analysis of the forces which led Noguchi to so many successes, but we may at least glimpse what the coming years will see more clearly. Underlying the idea leading up to the solution of some special problem is what may be called the moral ideal governing our activities, what it is all about, why we spend so much life energy in any given direction. Reading between the lines of Noguchi's protocols we may see a guiding ideal throughout, to do something useful for humanity in the struggle against disease and to do it as promptly as possible even by abandoning, at least temporarily, more interesting and stimulating paths. All his labors tend towards some practical end.

In this and in the more definite ideas and forecasts governing the choice of problems, we feel the dominating influence of his teacher, Simon Flexner. It is he who worked with him and for him; who recognized the special capacities of his ward and directed him towards the tasks which he so successfully carried out; who advised, encouraged, stimulated and repressed: for the dangers that surround the brilliant worker in letting his mind outrun his slower and more or less tedious physical progress are great, and, unless controlled, they not infrequently lead to sterility. Noguchi had another great advantage, without which even the best minds may remain unfruitful, namely material equipment. He was fortunate in having behind him the resources of the Rockefeller Institute for Medical Research. The internal evidence to be gathered from his published work is clear as to the exotic requirements of much of his work.

In technique Noguchi was master in many fields, but he especially excelled in creating his own methods. These were relatively simple, but his craftsmanship was such that he accomplished wonders with them. In biology, where so many unknown factors are involved in any problem, only close personal application and the modification of methods to suit the new and often unexpected situations that present themselves will eventually succeed.

The most impressive thing in Noguchi's scientific career was his marvelous industry. All of his numerous papers present the internal evidence of laborious, time-consuming processes, carefully controlled. Nowhere is there any indication of any devices automatically yielding results. His expeditions into the many fields of medical science were personally conducted and largely alone. His method appears to have been to make himself at the start master of all the work of his predecessors and of the current technique,—to which he always added original touches if not wholly new devices. He was scrupulously careful in giving due credit to earlier investigators; and he was seriously distressed to discover any lapses due to the difficulties of tracing unindexed results in old and new writings. He never appears to have gotten lost in his methods or to have permitted them to dominate him. He turned with facility, without a break, from one technique to another entirely different.

Noguchi's career in medical research may be divided into periods according to certain major problems. From about 1900 to 1908, he was absorbed in the study of snake venoms and a number of collateral problems in immunology. In the next period, to 1918, his work was chiefly upon syphilis and during this period he became interested in many other forms of spirochetes. In his last period, his major work was the bringing to light of etiological factors in yellow fever, Oroya fever, and trachoma. During the second and third periods he did not lose sight of his earlier work, and throughout this part of his career, medical literature contains papers on a variety of sub-

jects outside the domain of his major problems and harking back to his earlier preoccupations. These multitudinous interests were due in large part to his skilful technique which enabled him to bore successfully into more or less alien fields, among them, for example, protozoology in which even the masters were marking time.

At the beginning of his career he came into the field of pathology just as it was entering the new era of quantitative rather than qualitative experimental procedures. The discovery of toxins and antitoxins and the fairly accurate measurements of toxic and antitoxic energy during the last decade of the nineteenth century enabled him to apply them to his own particular tasks. In his many publications of this period he has always added something to the stock of demonstrable facts. A few details concerning these three periods will not be out of place on this occasion.

During the years from 1900-1907 he was busy with problems relating to the hemolysins and agglutinins of snake venom and the protective sera. He was also drawn into the study of chemically known substances acting as hemolytic agents. During most of his subsequent career he continued to dip into the Pandora's box of medical mysteries—the blood—for both problems and their solution. I believe it was Goethe who characterized the blood as "Ein ganz besonderer Saft," and Noguchi's life work has materially added to the existing evidence that it holds at least a part of the secret of all our problems. Towards the end of this early period he edited in book form his researches together with much information on the anatomy of snakes and the physical and chemical characters of the venoms. If he had stopped here, this large volume in itself would have established his reputation as a keen observer and experimenter and as one endowed with a breadth of view which regarded nothing short of the whole as his final objective.

Towards the end of the first decade he began his work on the many aspects of syphilis, which perhaps will leave

the most permanent record of his life work. At the beginning of this epoch, Schaudinn had already demonstrated spirochetes in the lesions of syphilis. Noguchi soon succeeded in obtaining pure cultures of the Treponema, with a craftsmanship applied to his special culture medium which few could follow. His demonstration of Treponema in the cerebral cortex of general paralysis and in tabes cleared once for all the diagnostic difficulties which surrounded these clinical entities. He developed a special diagnostic technique and defended its place beside the current methods with a great statistical array of actual tests. He did not stop with Treponema but continued to apply his technique to the pure culture of many spirochetes on the mucous membranes, and in external nature, which we had hopelessly seen flit across the fields of our microscopes from time to time.

We need only to mention here his cultivation of the globoid bodies in infantile paralysis and his important work in the development of a vaccine virus free from the miscellaneous bacteria of the bovine product. Much of his work of this and other periods will be taken up again and form the groundwork of further structures when our present anxiety to bring forth absolutely new scientific products will have subsided somewhat in favor of a more orderly development of the new territories discovered since the time of Pasteur.

In 1918, Noguchi began a series of researches on the etiology of obscure infectious diseases which was to continue until his death. In this, perhaps the most difficult field, his success was equal to that of his earlier demonstrations to reach the goal at which he aimed.

Infectious diseases of more or less identical clinical expressions so far as they are now understood, may have a bewildering array of different causes. Hence when a disease of unknown etiology presents itself, the cause may logically be referred to a variety of mechanisms. To pursue an inquiry into these requires a different preparation and a different procedure for every one of them. Which

of the latter is to be followed is naturally a matter of grave concern to the investigator and may mean success or failure. Moreover, there may be several living agents involved, working in series or together, both of which may be necessary, or one dominant. The incidence of disease may be seriously modified or obscured by longstanding endemic resistance, and its clinical nature so misread that it is regarded as of sporadic and relatively harmless character. In addition to these difficulties the discouragement which is associated with the many failures of earlier attempts by other skilful investigators must be overcome and be replaced by optimism and enthusiasm.

Of the three diseases studied by Noguchi during this last period yellow fever is undoubtedly the most formidable enemy of the race. In view of recent investigations on the African continent which thus far fail to substantiate Noguchi's results on the American continent, I have read again the papers on his yellow fever studies in South America. I do not see how anyone could have drawn inferences other than he did. He was at the time well versed in the work of his countrymen on the spirochetes of Weil's disease, which might have been confounded with it, having himself already added to current knowledge of this clinical entity. It remains for the future to inform us, whether a distinct clinical yellow fever complex exists which is due to spirochetes, or whether the South American type of yellow fever is so mild that it needs the cooperation of an endemic spirochete disease to make it effective. Such geographical alliances among microbes are not unknown and they form most interesting, albeit highly controversial chapters in etiological research, besides leading to the temporary rejection of valuable work. I may say in passing that it is not impossible that the future may unsettle many a well established cause of disease by unearthing some cooperating underlying invisible agencies. The most certain demonstration of the actual character of South American yellow fever would be found if this yellow fever should escape from the endemic territories in epidemic form, for it is often only in such escapes that

disease becomes primitive, exposes its original etiological foundation, and unfolds its most dangerous characteristics. I am convinced, however, that humanity is willing to wait for a more conservative and less cruel, even if more tardy, disclosure of the actual nature of this dread disease.

Noguchi's recent work on the Oroya fever of the Peruvian Andes brings out in clear detail, the existence of two widely differing clinical types of disease due to the same organism, a general febrile disease on the one hand, and a local process on the other. The work has been particularly instructive in bringing to the surface through Noguchi's culture methods a bacterium of peculiar habits and characters which, imitating the habits of a non-cultivable parasite of the red blood corpuscles, would lead most investigators astray. The most recent work on this disease, which completes the cycle of the microbe through the body of a biting insect, would have been extremely satisfactory to Noguchi had he lived to learn of it.

Noguchi's final work on trachoma is a striking demonstration of his capacity to dig down into the debris of earlier failures and bring success to the surface. He procured an organism with which he has produced in certain animal species a local disease indistinguishable from the human malady. In a superficial process of this kind, the investigator has to contend with a variety of more or less accidental parasites, often replacing or crowding out the earliest inciting factor, the detection of which however is essential to the final solution of the problem of causation. He had not lost any of the persistence and untiring industry shown in earlier work, for he eliminated one after another the many types of bacteria which lived in or on the trachomatous conjunctiva until one was found which produced characteristic lesions in certain monkeys. Even this one might have been passed by as of no special significance by most observers.

This very brief, hurried and imperfect glimpse of Noguchi's scientific activities, involving as it does the omis-

sion of many minor investigations, indicates not only the fertility of his ideas and methods, but points to the promise of important structures to be raised on his foundations by those not so preoccupied and harassed as he was by new and unforeseen tasks. The true test of scientific labor is its continuing fertility, and we believe Noguchi's work will also stand this test satisfactorily. His was a remarkable record of achievement for three decades of life work, and as the lesser contemporary endeavors pass into the ordinary text of history he will stand out more and more clearly as one of the greatest, if not the greatest, figure in microbiology since Pasteur and Koch.

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The controlling influences of a man's destiny, particularly in the field of science, arise out of his mental endowment, his natural traits, training, opportunities, and environment. I believe that Dr. Noguchi received a rich inheritance from his Japanese ancestry. His countrymen possess certain qualities which have rendered them especially apt in the cultivation of the biological sciences.

Dr. Noguchi had the power of clear, accurate observation, of drawing correct inferences from observed facts, and of vision and imagination in forming hypotheses, which are essential for creative work in science. He formulated clearly the questions which he asked of nature; and he had extraordinary ingenuity in devising and adapting methods for the solution of problems. He had also that Japanese quality which we of Anglo-Saxon race at least do not possess, a certain artistry, an artistry which can be seen in the method of his work and the presentation of his results.

These unusual qualities to which I have alluded, and a physique, apparently frail yet capable of great endurance under severe mental and physical strain, created a singularly gifted and attractive personality. This personality,

so simple, sincere, and kindly, combined with the weight and importance of his utterances on public occasions, captivated the audiences before whom he spoke. This was a great achievement for one addressing an audience in a speech foreign to him and of a race so remote from his own. It is true beyond all question that the influence of such a life of work, of such a personality as that of Dr. Noguchi, strengthens the sympathetic bonds between our two countries.

We have heard something of the early life and training of Dr. Noguchi and of the continuance through almost three decades of the association between Dr. Flexner and Dr. Noguchi. I am sure, if Dr. Noguchi could speak he would like to have commemorated on this occasion that intimate and sympathetic association, an association far more inspiring than the familiar and customary relationship of the head of a laboratory with the workers in it. It in no way detracts from Dr. Noguchi's originality to say that he was dependent upon this kind of sympathetic understanding and appreciation.

Dr. Noguchi brought great renown to the Rockefeller Institute. He also derived great benefits from the resources of that institute. Perhaps no more striking example of the benefits which may come to a certain type of original investigator in science from an institute of the character of the Rockefeller Institute, can be adduced than that exemplified in the life and work of Dr. Noguchi.

There is one point which I should like to stress, although Dr. Smith has already stressed it, namely, the importance of Dr. Noguchi's work in the study of yellow fever. I think that the subject needs a little emphasis, because should it appear, and it is likely to, I think, that the American disease and that prevalent in Africa are identical, should it appear that Noguchi's leptospira is not the cause of yellow fever, that does not imply that Noguchi's work was not a very important contribution. It is a contribution of the first importance if it demonstrated that cases of infectious jaundice are, according to the best

clinical traditions, occurring in epidemics diagnosed as yellow fever. It is of the utmost importance also to know whether the leptospira is a secondary invader in yellow fever. Nor were Noguchi's studies limited solely to the spirochete. I would simply like to emphasize on this occasion that, whatever the issue as to the relationship of the spirochete to yellow fever, Noguchi's work constitutes a very important contribution to the subject.

Memorial meetings such as this are perhaps of more benefit to those who participate than to the one commemorated. Noguchi's fame is secure. He stands now and did stand at the time of his tragic death among the foremost international figures in experimental medicine and biological science. But we do well to come together and to pay our tribute of respect and admiration and affection to the memory of such a man as this. We do well to cherish his memory, to perpetuate his name; and we should do better if we were inspired by his example, his singleminded devotion in the search for truth, his loyalty, and his desire to extend the boundaries of knowledge for the welfare of mankind.

DEATHS OF FELLOWS OF THE ACADEMY

James Ditmars Voorhees, B.A., M.A., M.D., Easthampton, L. I.; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1893; elected a Fellow of the Academy, March 6, 1902; died, July 30, 1929. Dr. Voorhees was a Fellow of the American College of Surgeons, a member of the Obstetrical Society, a member of the Society of Alumni of Sloane Hospital for Women and of the Alumni of Presbyterian Hospital. He was Consulting Obstetrician to the Greenwich General and the Southampton Hospitals.

John Henry Guntzer, M.D., 51 North Regent Street, Port Chester, N. Y.; graduated in medicine from Bellevue Hospital Medical College, New York City, in 1889; elected a Fellow of the Academy, December 3, 1908; died, August 5, 1929. Dr. Güntzer was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, and a member of the American Laryngological, Rhinological and Otological Association. He was Assistant Surgeon to the Manhattan Eye, Ear and Throat Infirmary, and Otologist and Larynologist to the United Hospital.